

Towards an Integrated Water Quality Toolbox

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Biographical Sketches of Authors

Henry Manguerra is a principal engineer at the Fairfax, Virginia Office of Tetra Tech, Inc. His experience includes the management and technical oversight of projects involving development of GIS, decision support systems, models, databases, and web applications to support various Clean Water Act programs of EPA, states, and the tribes. For example, he was Tt's project manager for EPA BASINS 3.0 development and its customization for various states and tribes. More recently, he led the development of a web-based user interface of STORET and other state's water quality databases to support impairment analysis, 303(d) listing, and TMDL development. The WQA toolbox is the latest in the series of tools that Tt is developing to make water quality and other related geographic and environmental data seamlessly accessible to the end users.

Mr. Zastrow is an aquatic ecologist employed with the Water Resources Division of Tetra Tech, Inc. in Fairfax, VA. His focus is aquatic primary production and his technical expertise includes seven years of experience in water quality data management and spatial analysis. He has been a team leader on projects such as the environmental data warehouse and delivery system for the Great Lakes WATER Institute (Milwaukee, WI), Florida DEP Environmental Data Extraction Tool, and the Southwest Florida Feasibility Study.

Gustavo Lopez is employed as a senior software developer at the Fairfax, Virginia office of Tetra Tech, Inc. He specializes in building enterprise scale web applications using technologies such as Java, XML, and SQL. He has been active in all stages of the development of the WQ Toolbox including design, implementation and testing.

Haihong Yang is a principal software engineer in Tetra Tech, Inc. He has over 10 years of programming experience concentrated in the development and application of GIS and DBMS-driven systems. For the Water Quality Analyzer Toolbox, he is involved in the Viewer customization with MapObjects for map display and impairments highlighting, and water quality data management with Web Service support.

Vaishal Sheth is a GIS software engineer at the Fairfax, VA office of Tetra Tech, Inc. He has practical experience in all parts of the software systems development life cycle including the assessment of user requirements, system design, implementation, testing, quality assurance and deployment.

Abstract

This paper describes a system of integrated software tools focused on conducting impairment assessments of natural surface waters. Leveraging XML, Web Services and GIS technology, the system provides tools for data summarization, trend plots, statistics, reports and impairment status determination of one or more selected waters. A web service allows the desktop users to seamlessly download and update the spatial and water quality data from a central data warehouse. Reference spatial data layers can be viewed in the desktop application through a web feature service without having to download it locally. The application comes packaged with the national water quality standards criteria and also an initial set of standards defined for the El Paso County, Colorado. Users can easily customize the application for their study area by modifying the standards through an intuitive interface. The system employs a modular architecture and comes with a core mapping framework and additional plug-ins for analysis and charting. This makes the system very customizable and expandable to address the needs of different organizations. Another component of the system is a desktop tool that allows data to be transferred from a local database to a central database using custom database field mappings that can be stored for future transfers. Use of XML as a data transfer standard can allow easy integration of the system with other data warehouses, such as EPA STORET. Future development objectives include the construction of a modular model builder allowing fine-grained user constructed analyses and rules.